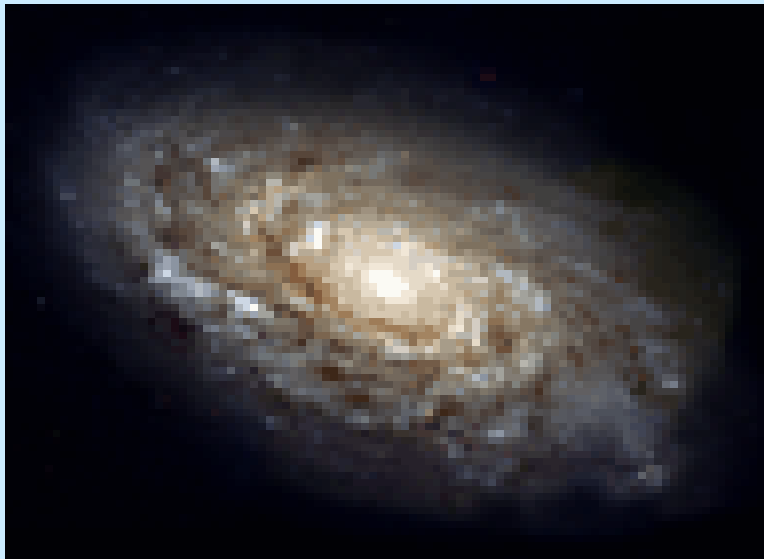
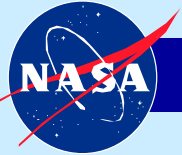


NASA Environmental Management System (EMS) Approach



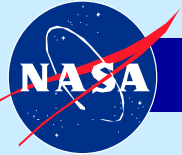
**Michael J. Green
Environmental
Management Division
NASA Headquarters
Washington, DC**



Presentation Overview

- **Background**
- **NASA challenges**
- **NASA EMS approach**
- **EMS corporate metrics**
- **EMS review & corrective action**
- **Benefits**

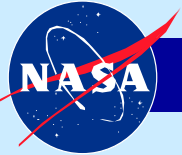




NASA MISSION

- To understand and protect our home planet
- To explore the Universe and search for life
- To inspire the next generation of explorers
... as only NASA can





Direction from the Top



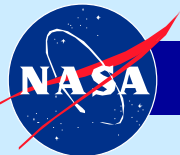
"The mission is to understand and protect the home planet. Protection includes using our scarce resources to improve life on Earth by living in an environmentally sound manner..."

Honorable Sean O'Keefe,

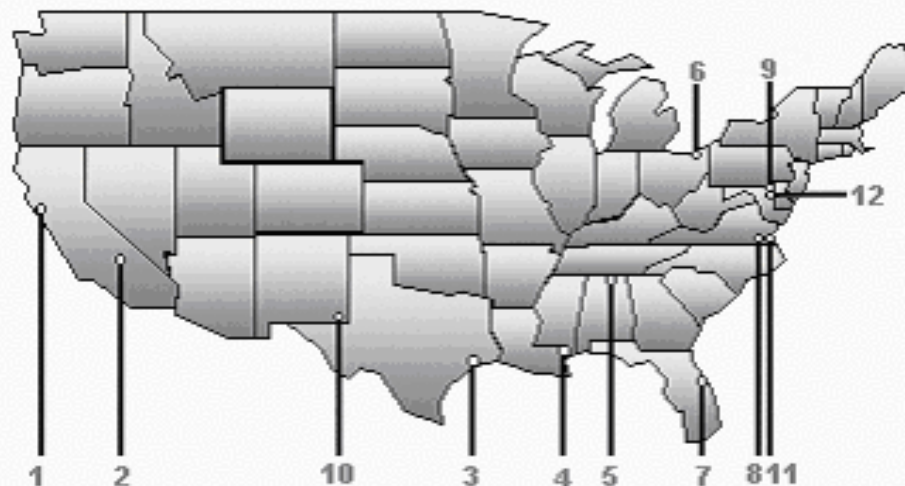
NASA Administrator

**Speaking to Maxwell School of
Citizenship and Public Affairs,
Syracuse University**

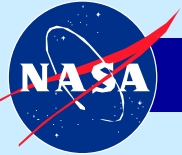
April 12, 2002



NASA Centers

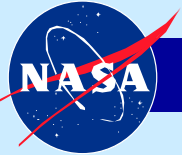


1. Ames Research Center
2. Dryden Flight Research Center
3. Johnson Space Center
4. Stennis Space Center
5. Marshall Space Flight Center
6. Glenn Research Center at Lewis Field
Glenn Research Center, Plum Brook Station
7. Kennedy Space Center
8. Langley Research Center
9. Goddard Space Flight Center
10. Johnson Space Center, White Sands Test Facility
11. Goddard Space Flight Center, Wallops Flight Facility
12. Headquarters



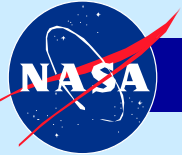
FACTORS AFFECTING EMS

- **Size of installations**
 - Land area - 150 to 150,000 acres
 - Population - 1,000 to over 10,000 on-site personnel
- **Complexity of installations**
 - Laboratories, test stands, wind tunnels, hangars, shops
 - Includes tenant organizations and private enterprises
- **Large contractor work force**
 - Several GOCO facilities
 - About 4 contractor employees per civil service employee
- **Geographic variability - 10 states**



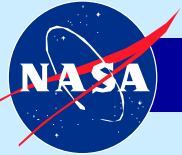
INITIAL ASSESSMENT

- **Business Case & Gap Analysis conducted in 1998**
 - Included Headquarters and 12 NASA installations
- **ISO 14001 recommended as NASA's EMS model**
 - NASA was accomplishing 80% of ISO 14001 requirements
 - Many elements of ISO 9000 can be utilized (e.g., corrective action, document and records management)
 - Existing processes can be utilized (e.g., emergency response)
 - Internationally recognized
 - Protocols can be used for evaluation & performance tracking
 - Allows flexibility
 - Contractor acceptability



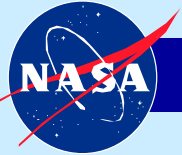
AGENCY CHALLENGES

- Quantifying resource requirements and benefits
- Developing corporate EMS metrics
- Clarifying HQS & Center roles and responsibilities
- Obtaining senior management commitment
- Determining how EMS will apply to contractors
- Implementing EMS at corporate/program level
- Incorporating into existing business systems
- Handling intensive up-front activities with limited staff
- Managing aspects, impacts, objectives & targets
- Holding activity accountable for its aspects & impacts



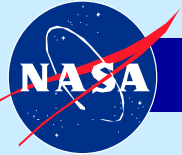
EMS DEVELOPMENT ACTIVITIES

- **Development of Agency EMS Manual**
 - Developed by NASA team from 5 Centers
 - Consistent but flexible Agency approach
- **Implementation at Glenn, Johnson and Stennis**
 - Included independent EMS audit by a registrar
- **Development of Center Implementation Guide**
 - Step-by-step approach to implementation
 - Sharing of lessons learned
- **Cost and Benefits Report**
- **Agency-wide implementation**



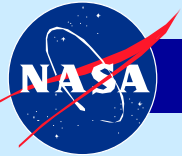
ELEMENTS OF NASA EMS

- **Environmental Policy**
- **Planning**
 - Aspects & Impacts
 - Legal & Other Requirements
 - Objectives & Targets
 - Environmental Mgmt Program
- **Implementation & Operation**
 - Structure & Responsibility
 - Training & Awareness
 - Communication
 - EMS Documentation
- Document Control
- Operation Control
- Emergency Preparedness & Response
- **Corrective Action**
 - Monitoring & Measurement
 - Nonconformance, Corrective & Preventive Action
 - Records
 - EMS Audits
- **Management Review**
- **Metrics**



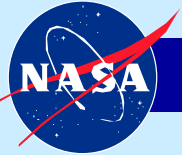
Aspects & Impacts Analysis

1. List activities, products & services
2. Identify impacts
3. Group impacts
4. Categorize into aspects
5. Categorize into focus areas
6. Categorize environmental consequences
7. Categorize severity
8. Determine frequency
9. Determine risk ranking
10. Determine objectives & targets



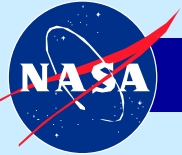
Environmental Aspects

- **Prevention**
 - Materials substitution
 - Process changes
 - Recycling
 - Pollution prevention
- **Conservation**
 - Natural resources
 - Cultural resources
 - Endangered species
 - Energy efficiency
 - Sustainability
 - Water conservation
- **Compliance**
 - Clean air
 - Clean water
 - Hazardous waste
 - Storage tanks
 - State & local regulations
- **Restoration**
 - CERCLA
 - RCRA
 - Storage tanks



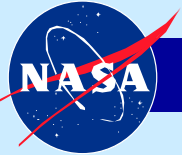
Strategic Focus Areas

- **Prevention** – reduce future problems through an active pollution prevention program
- **Conservation** – preserve our rich natural and cultural heritage for future generation
- **Compliance** – bring all operations into compliance with environmental requirements
- **Restoration** – clean up all problems resulting from past operations



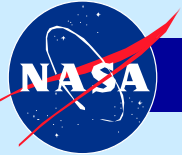
Environmental Consequence

- **Safety and Health**
 1. Death or disabling injury
 2. Severe injury/lost time
 3. Minor injury/health impact
 4. No injury or health effect
- **Natural and Cultural Resources Impacts**
 1. Irreparable damage
 2. Substantial Impact
 3. Minimal impact
 4. No impact



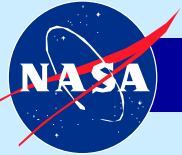
Environmental Consequence

- **Cost to NASA**
 1. Greater than \$250,000
 2. \$100,000 to \$250,000
 3. \$50,000 to \$100,000
 4. Zero to \$50,000
- **Mission Impacts**
 1. Delay in mission-critical activity
 2. No delay, but large cost to avoid delay
 3. No delay, but minimal cost to avoid delay
 4. No delay, no cost



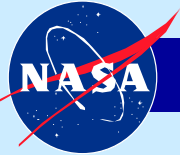
Environmental Consequence

- **Reputation & Stakeholder Relationship**
 1. Increase in negative public inquiries/ meetings
 2. Adverse effect on NASA reputation or relations
 3. Minimal effect on NASA reputation or relations
 4. No effect on NASA reputation or relations
- **Legal & Regulatory Implications**
 1. Fine, consent agreement, or unilateral order
 2. Notice of violation with no fine
 3. Informal notice
 4. No regulatory action

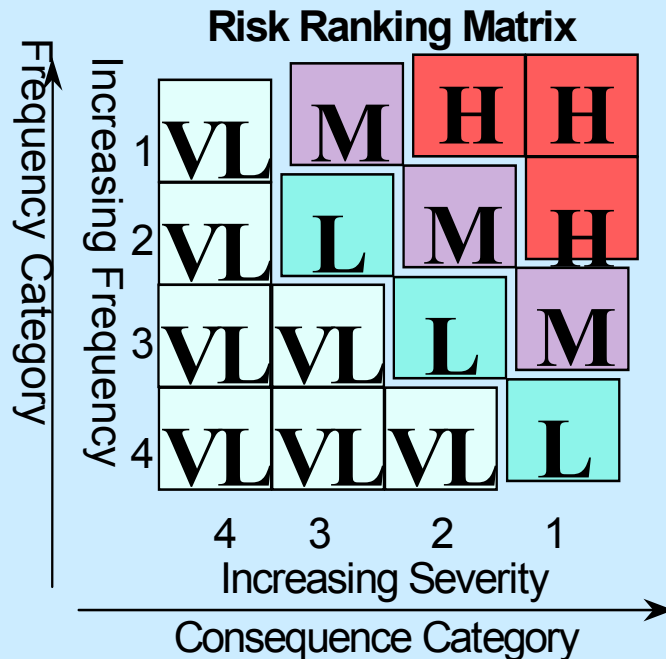


Frequency of Occurrence

Category	Potential Frequency of Occurrence
1	Minimum of once a year
2	Minimum of once, time period 1 to 5 years
3	Minimum of once, time period 5 to 10 years
4	Minimum of once in 10+ years



Risk Ranking Matrix



Action Priority Categories



High

Shall be managed with an environmental management system objective and target



Medium

Shall be managed to avoid becoming high



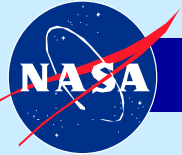
Low

Shall be managed as appropriate



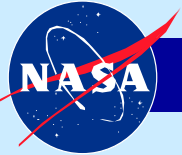
Very Low

Shall be managed as appropriate



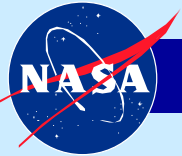
EMS Performance Metrics

- **Objectives & Targets**
 - Rate of meeting objectives & targets within specified timeframe
- **Corrective & Preventive Action**
 - Rate of closure of non-conformances
- **Management Reviews**
 - Verifying Centers conducting management reviews



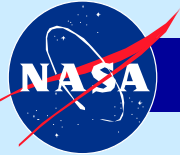
Environmental Functional Review

- **EMS audit – NASA team**
 - Uses EMS checklist based on NASA EMS manual
 - Can serve as internal audit for registration
 - Can satisfy self-certification approach
- **Compliance audit – contractor team**
 - Utilizes Army CERL TEAM protocols
- **Conducted on 3 year cycle**
- **Corrective and preventive action system**
 - Center addresses findings under Center system
 - Headquarters tracks and follows-up to verify corrective action



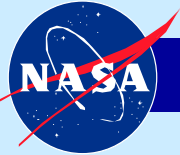
Expected Benefits

- Mission delay reductions
- Change order reductions
- Environmental impact reductions
- Reduced liability
- Increased compliance
- Increased management support and involvement
- Increased pro-activity
- Reduction of single-point failures
- Continual improvement
- Decreased energy use, water use, and materials reductions
- Health benefits
- Decreased # of fines and NOVs
- Decreased employee time (fewer inspections)
- Reduced # of inspections
- Written procedures, process consistency, & repeatability
- Increased efficiency
- Improved communications



Expected Benefits

- Increased # of pollution prevention initiatives
- Cost reductions
- Increased safety
- Reduced # of regulations
- Reduced # of spills
- Increased affirmative procurement
- Increased recycling revenue
- Solid waste reduction
- Prioritization of funding projects
- Increased # of green building designs
- Increased # of sustainability projects
- Better NASA reputation (Center and Agency)
- Better relationship with stakeholders
- Increased trust and satisfaction from customers



POINT-OF-CONTACT

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